

SECTION II—REMARKS

Applicants respectfully request reconsideration of the above referenced patent application for the following reasons:

Reply to Applicants' prior remarks

Responsive to Applicants' prior remarks filed June 25, 2010, the Examiner withdraws the rejections to Applicants' claims under 35 U.S.C. § 103 citing primarily Gowrisankar and further citing Giannakis, stating that Applicants arguments are persuasive and thus, the rejection has been withdrawn.

However, the Office Action now states at page 2, number 2 in the "Response to Arguments" section that "Applicant's arguments filed 11/16/09 have been fully considered **but they are not persuasive.**" The Office Action further raises claim objections and requests a terminal disclaimer.

Applicants traverse the new rejections and address the objections in the remarks that follow.

Claim Objections

The Office Action objected to claims 30, 35 and 40 because of informalities. In particular, the Office Action states that the term "NG" in the independent claims should be replaced with "MG" and further states that a definition for "M" should be added to the claims.

Applicants agree. Accordingly, Applicants have replaced the term "NG" with the term "MG" in each of the independent claims, and Applicants now recite within claims 30 and 35,

"wherein *M* represents a number of transmit antennae." Refer to the support set forth in Applicants' specification at paragraph 11, line 2-3 which states:

... for use within a multicarrier communication system with *M* transmit antenna(e) and *N* receive antenna(e)

With respect to claim 40, the term *MG* is now recited, however, a definition for "M" is already recited within the claim as, "**a number *M* of omnidirectional antennas**, wherein *M* comprises more than two omnidirectional antennas ..." Accordingly, further definition of the term "M" is not necessary with respect to claim 40.

In accordance with the above remarks, Applicants respectfully submit that the amendments to the claims overcome the objections, and thus, respectfully request the Examiner to withdraw the objections.

Remarks regarding Terminal Disclaimer:

The Office Action at page 2, item 3, states:

It is also noted that terminal disclaimer has not yet been filed to overcome the provisional double patenting rejection for application number 10/789,387, which is now Patent US 7,782,970.

This rejection was listed in the Final Office Action dated February 20, 2008 at page 3, item 3, stating:

3. Claim 23 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/189,387. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant application recites "an article of manufacture comprising a storage medium having instructions stored thereon", whereas the copending application recites a method. It would have been obvious to one skilled in the art to provide a storage medium executing the method described in the copending application, for

the purpose of executing the instructions for performing the specified functions.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

A similar “provisional obviousness-type double patenting rejection” was also raised against claim 1 in the Office Action dated June 29, 2007.

Applicants respectfully point out that claims 1 and 23 have been canceled, and thus, the “provisional obviousness-type double patenting rejection” raised in the June 29, 2007 Office Action against claim 1 and the similarly raised rejection in the February 20, 2008 Office Action against claim 23 and are each rendered moot.

Because the rejections are moot (e.g., because claims 1 and 23 are and remain canceled), it is not necessary to file a terminal disclaimer to overcome the rejections, regardless of the fact that the cited application is now patented.

Accordingly Applicants consider the issue to be resolved and respectfully request the Examiner to please indicate as such upon the record so as to eliminate any potential for further confusion.

Rejections under 35 U.S.C. § 103

The Office Action rejects claims 30-39 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,865,237 to Boariu et al. (“Boariu”) in view of U.S. Patent No. 7,224,744, to Giannakis et al. (“Giannakis”).

Review of Prosecution History:

The Office Action dated August 19, 2009, at page 3, item 9, rejected independent claim 30 under 35 U.S.C. § 103 in view of Boariu and Giannakis on the grounds of the same analysis which is set forth in the present Office Action beginning at page 3, item 9.

Responsive to Applicants' prior remarks dated November 16, 2009, the Examiner states in the Office Action dated April 06, 2010, at page 2, item 1 under the "Response to Arguments" section:

Applicant's arguments, see pages 8-9 filed 11/16/09, with respect to the rejections(s) of claims 30, 35, and 40 under 35 USC 103(a) have been fully considered and are persuasive. **Therefore, the rejection has been withdrawn.** However, upon further consideration, a new ground(s) of rejection is made in view of a new prior art reference. (Emphasis added.)

The present Office Action now reverses its prior position by stating:

However, upon further consideration, Applicants' arguments filed 11/16/09 **have been fully considered but they are not persuasive.** Applicant argues Boariu fails to disclose rate-one coding. However, Examiner respectfully disagrees. Boariu does teach rate-one coding in col. 12, lines 51-53, which describes *rate R=1 coding for 4 antennas*. In addition, it would have been obvious to one skilled in the art to combine the teachings of Boariu and Giannakis, in order to reduce decoding complexity without sacrificing diversity or coding gains (Giannakis: col. 8, lines 60-61).

Applicants respectfully traverse the re-rejection of the claims in view of Boariu and Giannakis in the remarks that follow.

Boariu fails to disclose a "vector of input symbols (s)" having "size Nc x 1" as claimed:

At page 4, first paragraph, the Office Action states that Boariu discloses antennas to receive content:

wherein the received content is a vector of input symbols (s) of size $Nc \times 1$, wherein Nc is the number of subcarriers of the multicarrier wireless communication channel

In support of this assertion, the Office Action makes reference to Boariu at column 12, lines 57-63 which discloses:

Let us first examine the forming of a freely selected square complex space-time block code. Assuming the number of transmit antennas is $N=2^{K-1}$, where K is an integer and bigger than two. By means of the obtained code, K complex number modulated symbols can be transmitted during N symbol periods. These symbols can be marked with s_k , $k=1, \dots, K$.

Thus, Boariu explains that “K complex number modulated symbols can be transmitted during N symbol periods,” and further explains how such “symbols” are marked.

Notwithstanding Boariu’s mechanism of transmitting and marking symbols, Boariu fails to disclose that the “received content is a vector of input symbols (s) of size $Nc \times 1$, wherein Nc is the number of subcarriers of the multicarrier wireless communication channel.”

For instance, Boariu is silent with respect to the “size” of a received “vector of input symbols (s)” whereas Applicants expressly state that the “size” of such a vector is “ $Nc \times 1$.” Applicants further expressly recite within the claim that the size of “ $Nc \times 1$ ” is defined such that “ Nc is the number of subcarriers of the multicarrier wireless communication channel.” Boariu fails to address such considerations which are taught and expressly recited by Applicants within independent claim 30.

At the subsequent passage of Boariu beginning at column 12, line 64, Boariu does provide some discussion of the proportionality of a “unitary NxN matrix,” however, proportionality of a matrix (e.g., Boariu’s square complex space-time block code) is not equivalent to the explicitly recited “size $Nc \times 1$, wherein Nc is the number of subcarriers of the multicarrier wireless communication channel” limitation claimed by Applicants.

Moreover, Boariu explains that his disclosed layering mechanism utilizes the “received signals and the powers of the estimated channels.” For example, refer to column 27, lines 43-54 in pertinent part as follows:

The upper layer codes can be designed so that it is possible to **construct upper layer pseudo-received signals** in which the interference from the lower layers is cancelled completely. **These pseudo-received signals are constructed from the received signals and the powers of the estimated channels.** The upper-layer code can thus be decoded directly, without considering lower-layer interference. The decoded upper layer can then be cancelled from the received signals, and the lower layer may be decoded linearly. This decoding scheme is sensitive to changes in the channels over the whole multi-layer block.

Boariu further discusses the received signal and symbols at column 29, lines 1-19 as follows:

The redundant direction of a coding block of form (63) is spanned by the matrix

$$\beta_0 = \begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{pmatrix} \quad (67)$$

This can be seen if $R=C(s)\alpha+\text{noise}$ to be the received symbol, when the conventional block code equation $C_{3/4}$ above is used for transmission, and α is the channel vector. The reception-space-orthogonality of the block-code reception subspace to the higher layer reception subspace is reflected in the fact that for this R ,

$$\alpha^T \beta_0 R = 0 + \text{noise}. \quad (68)$$

This equation is the basis of the layering embodiment of the invention.

In the above passage, Boariu speaks in more detail to the “received symbol” utilized by his disclosed “layering” mechanism which provides for the ability to reduce inefficiency of his rate codes, but Boariu’s disclosed mechanism is different from that which is claimed by

Applicants and says nothing with respect to the “size” of a received “vector of input symbols (s)” being that of “ $N_c \times 1$,” where “ **N_c is the number of subcarriers of the multicarrier wireless communication channel**” as claimed by Applicants. Again, proportionality of an $N \times N$ matrix is not the same as a vector of input symbols of size “ $N_c \times 1$,” in which “ **N_c is the number of subcarriers**” as Applicants recite. Boariu fails to account for the specificity claimed by Applicants, regardless of the size his resulting $N \times N$ matrices may be.

Because Boariu fails to disclose at least one limitation which is recited by Applicants in independent claim 30, Applicants respectfully submit that independent claim 30 is patentable over Boariu.

At page 4, second paragraph, the Office Action correctly concedes that Boariu fails to disclose particular limitations which Applicants recite in independent claim 30, but asserts that Giannakis cures the admitted deficiencies of Boariu.

Giannakis, however, whether considered individually or in combination with Boariu, does not cure the deficiencies of Boariu as discussed above with respect to independent claim 30 because Giannakis is similarly silent with respect to the “size” of a received “vector of input symbols (s)” having a “size” of “ $N_c \times 1$,” where “ **N_c is the number of subcarriers of the multicarrier wireless communication channel**” as Applicants recite in independent claim 30.

Because the combination of Boariu and Giannakis fail to disclose at least one limitation as Applicants recite in independent claim 30, Applicants respectfully submit that independent claim 30 is patentable over the references and in condition for allowance. Applicants further submit that independent claims 35 and 40, which recite similar limitations, as well as those claims which depend directly or indirectly upon independent claims 30, 35 and 40, and thus incorporate the limitations of their respective parent claims, are also patentable over the

references and in condition for allowance for at least the same reasons as stated above with respect to independent claim 30 rejected under 35 U.S.C. § 103.

Accordingly, Applicants respectfully request the Examiner to withdraw the rejection to the claims under 35 U.S.C. §103.

Boariu fails to disclose “generating a rate-one, space-frequency code matrix” as claimed:

At page 2, item 2, the Office Action states that upon further consideration, it views Boariu as disclosing “rate-one coding in col. 12, lines 51-53, which describes rate R=1 coding for 4 antennas.” That relevant passage is set forth below corresponding to column 12, lines 51-64 of Boariu as follows:

The codes of the present invention have rate R=1 and are easily decodable. For the 4-antenna case, a diversity of order 3 is achieved. The present invention minimizes the inherent non-orthogonality and have simple linear decoding, which may be iterated. The present invention is also backward compatible with 3GPP release 99 open-loop diversity mode.

Let us first examine the forming of a freely selected square complex space-time block code. Assuming the number of transmit antennas is $N=2^{K-1}$, where K is an integer and bigger than two. By means of the obtained code, K complex number modulated symbols can be transmitted during N symbol periods. These symbols can be marked with s_k , $k=1, \dots, K$.

Thus, Boariu discloses that “codes of the present invention have **rate R=1** and are easily decodable.”

However, Applicants do not merely recite codes with “rate R=1” which are “easily decodable.” Instead, Applicants recite within independent claim 30, “**generating a rate-one, space-frequency code matrix from the received content**.”

As discussed above, the “received content” of Boariu is different from that which is recited by Applicants. This is a result of Boariu disclosing a distinct mechanism from that which is taught and claimed by Applicants.

In particular, Applicants expressly recite “the received content is a vector of input symbols (s) of size Nc x 1, wherein Nc is the number of subcarriers of the multicarrier wireless communication channel.”

As discussed in the prior section above, Boariu discloses and utilizes a different and distinct type of “received content.” In particular, Boariu’s received content is not a vector of input symbols (s) of size Nc x 1, wherein Nc is the number of subcarriers of the multicarrier wireless communication channel,” as Applicants recite.

Because Boariu fails to disclose the same or equivalent “received content” which is recited by Applicants, it necessarily follows that Boariu’s disclosed mechanism cannot “generat[e] a rate-one, space-frequency code matrix from the received content” as Applicants recite.

To interpret Boariu’s disclosed mechanism as doing so creates a logical fallacy because Boariu’s mechanism cannot create something (e.g., Applicants recited rate-one, space-frequency code matrix” from that which is unavailable to Boariu’s mechanism, namely “from the received content” as claimed by Applicants.

It would further be inappropriate to dissect Applicants’ claim into parts or pieces so as to construct such an interpretation. For instance, Applicants respectfully make reference to M.P.E.P. §§ 2141.02(1) and 2106(II)(C) which state in pertinent part:

I. THE CLAIMED INVENTION AS A WHOLE MUST BE
CONSIDERED

In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, **but whether the claimed invention as a whole would have been obvious.** *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983) . . . [Refer to M.P.E.P. § 2141.02(1), emphasis added.]

* * *

Finally, when evaluating the scope of a claim, **every limitation in the claim must be considered.** Office personnel **may not dissect a claimed invention into discrete elements** and then evaluate the elements in isolation. Instead, the **claim as a whole must** be considered. See, e.g., *Diamond v. Diehr*, 450 U.S. at 188-89, 209 USPQ at 9 . . . [Refer to M.P.E.P. § 2106(II)(C), emphasis added.]

Because Applicants recite generating the “rate-one, space-frequency code matrix from the received content,” Boariu fails to disclose the limitation in as much detail as claimed by Applicants, and thus, Applicants respectfully submit that independent claim 30 is patentable over the cited reference and in condition for allowance.

As noted above, the Office Action asserts that Giannakis cures the admitted deficiencies of Boariu. However, as Applicants previously noted, Giannakis, whether considered individually or in combination with Boariu, does not cure the deficiencies of Boariu as discussed above with respect to independent claim 30 because Giannakis is similarly silent with respect to the “size” of a received “vector of input symbols (s)” having a “size” of “ $N_c \times 1$,” where “ N_c is the number of subcarriers of the multicarrier wireless communication channel” as Applicants recite in independent claim 30.

Because the combination of Boariu and Giannakis fail to disclose at least one limitation as Applicants recite in independent claim 30, Applicants respectfully submit that independent claim 30 is patentable over the references and in condition for allowance. Applicants further submit that independent claims 35 and 40, which recite similar limitations, as well as those

claims which depend directly or indirectly upon independent claims 30, 35 and 40, and thus incorporate the limitations of their respective parent claims, are also patentable over the references and in condition for allowance for at least the same reasons as stated above with respect to independent claim 30 rejected under 35 U.S.C. § 103.

Accordingly, Applicants respectfully request the Examiner to withdraw the rejection to the claims under 35 U.S.C. §103.

Rejection of claims 40-44 under 35 U.S.C. § 103

The Office Action rejects claims 40-44 under 35 U.S.C. § 103(a) as being unpatentable over Boariu, Giannakis, and U.S. Patent No. 6,801,788 to Csapo et al. (“Csapo”).

Csapo, whether considered individually or in any combination with Boariu and/or Giannakis, fails to cure the deficiencies of Boariu and Giannakis as discussed above with respect to the rejection of independent claim 30 under 35 U.S.C. § 103, given that Csapo similarly fails to disclose that the “received content is a vector of input symbols (s) of size N_c x 1, wherein N_c is the number of subcarriers of the multicarrier wireless communication channel” as set forth in independent claim 40 or “generat[ing] a rate-one, space-frequency code matrix from the received content for transmission on the multicarrier wireless communication channel,” as Applicants recite in independent claim 40.

Dependent claims 41-44 incorporate the limitations of independent claim 40 upon which they directly or indirectly depend, and thus, the dependent claims are patentable over the combination of references and in condition for allowance for at least the same reasons as stated above with respect to the rejection of independent claim 40 under 35 U.S.C. § 103.

Accordingly, Applicants respectfully request the Examiner to withdraw the rejection to the claims under 35 U.S.C. §103.

CONCLUSION

Given the above remarks, all claims pending in the application are in condition for allowance. If the undersigned attorney has overlooked subject matter in any of the cited references that is relevant to allowance of the claims, the Examiner is requested to specifically point out where such subject matter may be found. Further, if there are any informalities or questions that can be addressed via telephone, the Examiner is encouraged to contact the undersigned attorney at (503) 439-8778.

Charge Deposit Account

Please charge our Deposit Account No. 02-2666 for any additional fee(s) that may be due in this matter, and please credit the same deposit account for any overpayment.

Respectfully Submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

/Spencer K. Hunter/

Spencer K. Hunter
Registration No. 67,337
Attorney for Applicants

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Date

Blakely, Sokoloff, Taylor & Zafman LLP
1279 Oakmead Parkway
Sunnyvale, CA 94085-4040
Telephone: (503) 439-8778
Facsimile: (503) 439-6073